Panel Discussion:
NASA IV&V Project Lifecycle and Support

- Purpose:
  - Discuss IV&V refinements made over the past year that are in progress and improving the way we work
    - Better Products (Issues, Reports)
      - using more formal, repeatable methods, performing more quality checks, and providing additional IV&V support services
    - Improved Knowledge Sharing and Transfer
      - TQ&E Support, Catalog of Methods, Reviews, On-Orbit Anomaly Research, and Lessons Learned
  - Entertain Questions from Audience on several topics

Panel Discussion Topics and Speakers

- NASA IV&V Program
  - Ken Vorndran
- Technical Quality & Excellence (TQ&E)
  - Pat Theeke, Phil Loftis, Joelle Loretta, Steve Husty
- Capability Development (CD)
  - Bill Stanton
- Independent Test Capability (ITC)
  - Steven Seeger, Bill Stanton
- On-Orbit Anomaly Research
  - Joe Painter, Salvatore Cilento
- Lessons Learned
  - Stephanie White
- IV&V Projects
  - Frank Huy, Bill Stanton

NASA IV&V Program – Ken Vorndran

- IV&V Program Direction and Plans
- IV&V Framework and Support Groups
  - Management, Projects, TQ&E, CD, ITC, On-Orbit, Lessons Learned
- Managing Projects – Expectations and Planning
  - WBS, IPEP, TS&R, Risk Management, Lessons Learned
- Questions

TQ&E – Pat Theeke, Phil Loftis, Joelle Loretta, Steve Husty

- Technical Framework
- Catalog of Methods
- Quality Checks
- TQ&E Project Support

Technical Framework

Catalog of Methods

Quality Checks

Project Support

TQ&E – Pat Theeke, Phil Loftis, Joelle Loretta, Steve Husty

- Lessons Learned and Challenges
- Questions

Capability Development – Bill Stanton

- Plans and application to IV&V
- Technical Trends
- Lessons Learned and Challenges
- Questions

Independent Test Capability – Steven Seeger

- ITC Plans and Project Support

Independent Test Capability

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Internal Website: http://itc.ivv.nasa.gov

ITC Team Members

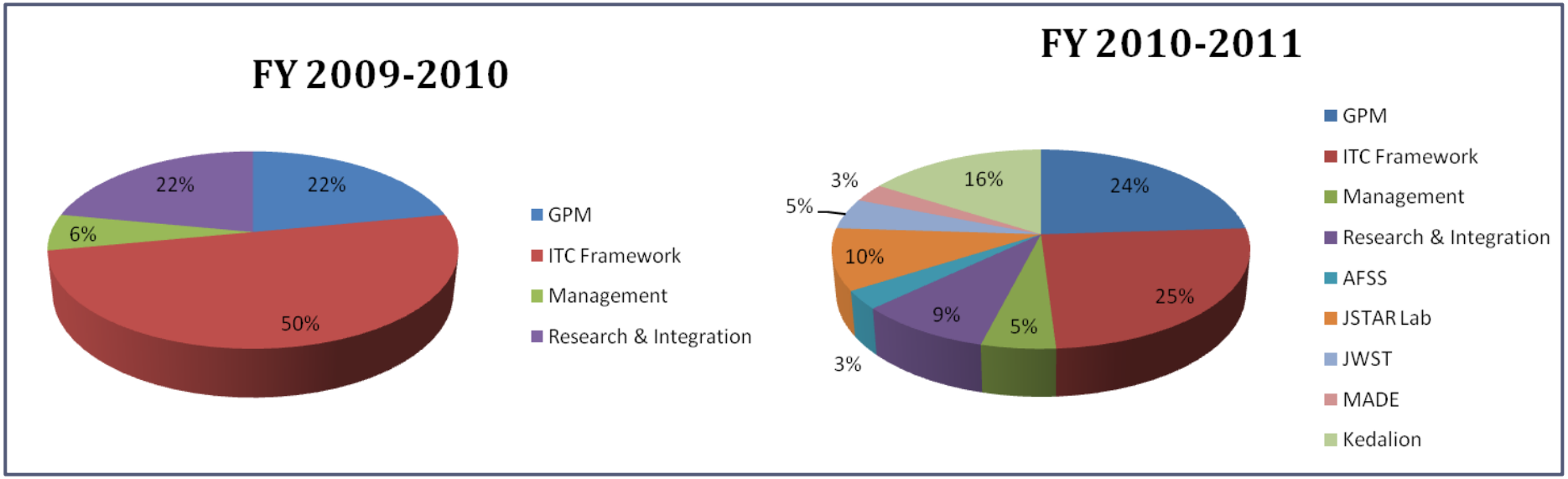
Justin Morris
Steven Seeger
Brandon Bailey
Shawn Carroll
Jeff Joltes
Justin McCarty
Dan Nawrocki
David Soto

ITC Background

ITC Charter

Develop, maintain, and operate an adaptable test environment for the IV&V Program that enables the dynamic analysis of software behaviors for multiple NASA missions

ITC Team = experts in simulation
IV&V Project Team = experts in systems



FY12 Project Support

GPM

- Complete integration of Goddard Dynamic Simulator (GDS)
- Add features to Instrument Simulations
- Provide analyst support as necessary to maintain GPM test environment to support 4.0 to 4.x testing (BVT and system-level)

JWST

- (ISIM FSW) Setup and configure JWST ISIM hardware-in-the-loop test environment
- (ISIM FSW) Collaborate with JWST ISIM team to maintain test environment
- (Spacecraft FSW) Scope effort to develop software-only simulator to support JWST independent testing
- ISIM – Spacecraft System Integration

MPCV

- Collaborate with Kedalion, Lockheed Martin, and Honeywell personnel to maintain a Socrrates-Heavy (single) and Socrrates-Lite (multiple) configurations to support the current internal research tasks as well as future IV&V testing efforts

FY 12 Project Support

ISS-MADE

- Install all MADE FQT configurations in the JSTAR lab
- Acquire associated documentation for all MADE FQT configurations
- Develop a process for maintaining MADE FQT configurations
- Re-scope effort of standing up full MADE HSI test configuration based on internal need by IV&V ISS analysts

JPSS

- Continue collaboration with JPSS development efforts to setup a hardware-in-the-loop (HWIL) test environment for JPSS
- Consider supporting development of JPSS software-only simulator

GOES-R

- Investigate the feasibility to ascertain a copy of the GOES-R All Software Testbed (AST). Build 1.0 delivery occurs in September 2011 to GSFC/NOAA.
- Investigate collaboration opportunities in Simics-based development work with LM. LM is paralleling approach that was taken to develop GPM Operational Simulator.

Objective

Support Every Project in the IV&V Program in Five Years

Strategies	Steps
Select projects wisely considering available external simulators, partnerships, time, and resources Increase awareness of common technologies and practices across IV&V-supported projects Become involved in future missions early in project lifecycles	**FY10:** ITC Framework backend developed with core set of functionality. **FY10:** GPM selected as a pilot project. Scope initially limited, partnership with GSFC formed in early stages, and proper resources were available. **FY10:** Reusable Components and Knowledge Transfer: Developed 1553 middleware, internal Program training. Developed an approach to developing instrument simulations using Interface Control Documents.

Objective

Support Every Project in the IV&V Program in Five Years

Strategies	Steps
	FY11: Selected JWST and MPCV as primary supported projects *(Mission Portfolio)* **FY11:** Selected AFSS project as a means to pilot dynamic test coverage study **FY10-15:** Dedicate ITC resources to training and working alongside IV&V analysts on simulation and test tools to ensure success **FY12:** Get more involved in early concept phases of IV&V-supported projects **FY12-15:** Revise plan and resources required to support single and multiple projects and determine roadmap to support all future projects

Independent Test Capability – Steven Seeger, Bill Stanton

- Using ITC for IV&V Test Readiness Review
- Lessons Learned and Challenges
- Questions

On-Orbit Anomaly Research – Joe Painter, Salvatore Cilento

- Goals of Research
  - Improve the NASA IV&V analysis and processes to help discover potential software-related faults, which have escaped IV&V analysis in the past, and identify ways to protect against them
  - Provide value to current IV&V projects by communicating relevant lessons learned derived from anomalies on previous missions
  - Provide the SW Engineering community with information to help develop more robust SW systems
- Lessons Learned and Challenges
- Questions

Lessons Learned – Stephanie White

- **Challenges**

Lack of use

- Input
  - Only 37 published LLs
  - About 35 in queue (SSP and Ares closeout)
- Output (perception)

- **Current/Future Plans**

Tiger Team (met 9/7/11)

- Identify/understand goals of LL
- Identify strategies/provide suggestions for approaching LL more comprehensively:

  gain, package, store, disseminate, and use

- Project Support
- Questions

IV&V Projects – Frank Huy, Bill Stanton

- What attributes/services are valuable in supporting Project
- What/How IV&V Methods, Tools, Reviews, Services are applied
  - How they support providing better products
  - What are their limitations and % coverage
- Lessons Learned and Challenges
- Questions

Additional Questions / Wrap Up